network

Flashlink User Manual

LIS-SDI

SD-SDI LINE SYNCHRONIZER

Rev. 3

network-electronics.com

Revision history

The latest version is always available in pdf-format on our website:

http://www.network-electronics.com/

Current revision of this document is the uppermost in the table below.

Revision	Replaces	Date	Change Description
3	2	2008-11-05	Corrected typing errors.
2	1	2007-10-26	New front page.
1	0	2007-09-11	Added Materials Declaration and EFUP; updated EC Declaration of Conformity.
0	A	07.04.05	First official release; no changes to content.
A		09.04.03	Initial version. PIC sw. rev. 1.0.1. Firmware rev. 1.2

Quick Start Guides for LIS-SDI

Used as a line synchroniser with deglitcher.

1. Attach SDI input and SDI output(s) to the backplane module (see Figure 2 on page 8) and attach the Black&Burst signal to the backplane. Terminate the Black&Burst signal with 75ohm to ground.

2. Set DIP-switch 1 *on* (towards backplane). Set DIP-switch 3 *on*. Leave the rest of the switches untouched.

3. Insert LIS-SDI into a slot in the sub-rack.

4. Power on. After one second the LIS-SDI should be running, all LEDs should be green, see section 5.2. Note that up to 12 seconds may be necessary to synchronise SDI and Black&Burst at initial power up.

5. The BCD switches and the pushbuttons *must* be used to adjust which line and sample the output will lock to. The output phase must be set with respect to the Black&Burst signal in such a way that the delay through the card is between 41 samples and 1 line and 41 samples. (See section 4.3)

Used as a video deglitcher.

1. Attach SDI input and SDI output(s) to the backplane module (see Figure 2 on page 8) and attach the Black&Burst signal to the backplane. Terminate the Black&Burst signal with 75ohm to ground.

3. Insert LIS-SDI into a slot in the sub-rack.

4. Power on. After one second the LIS-SDI should be running, all LEDs should be green, see section 5. Note that up to 12 seconds may be necessary to synchronise SDI output to the Black&Burst input at initial power up.

5. The output from LIS-SDI is now delayed ca ½ line with respect to the SDI input. When an upstream switch is performed and a SDI input with another phase is placed on the input. The delay through the line sync is changed, but the output phase is the same. When in deglitching mode, the different SDI inputs must not have phases that differ more than ± ¼ line.

Note that if a GYDA controller is used, switch 1 should be in the *off* position.

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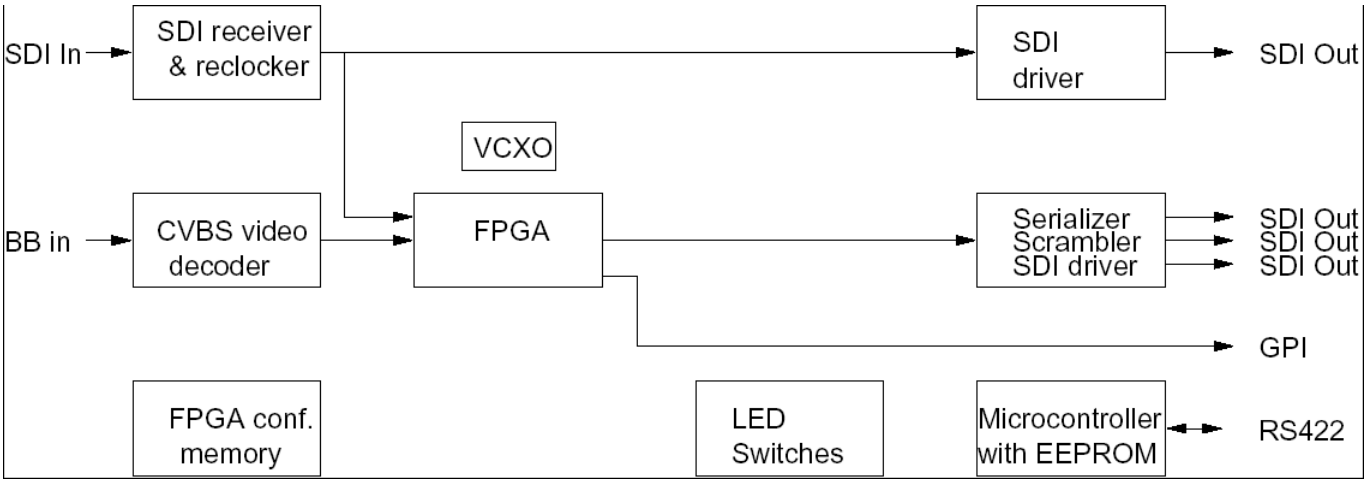

Figure 1: Simplified block diagram of the LIS-SDI card

1. General

The flashlink® LIS-SDI line synchroniser synchronizes the output SDI to the Black&Burst signal with an adjustable phase relative to Black&Burst signal. The LIS-SDI deglitches the digital signal when upstream switching is performed. It is possible to correct false F (Field), V (Vertical blanking) and H (Horizontal blanking) bits in TRS sync words. The LIS-SDI has an option to shift the whole video picture up and down with respect to the Vertical sync.

LIS-SDI user parameters can be changed via switches on the unit, or via the GYDA control interface.

2. Specifications

Digital Serial Input

Input format:	270 Mb/s scrambled NRZI (4:2:2 SMPTE 259M-C)
Output level:	800mV nominal, 75ohm terminated
Equalization	Automatic up to 35 dB (300 m Belden 8281)
Return loss:	> 15 dB

Black&Burst input

Input signal	SMPTE 170M/PAL ITU 624-4
Return loss	> 35 dB up to 5.75 MHz

Digital Serial Output

Output format:	270 Mb/s scrambled NRZI
Output level:	800 mV nominal
Return loss:	> 15 dB

Other

Input voltage	DC 5 V DC –15 V
Power consumption	< 3.2 W
Minimum delay	41 video samples
Maximum delay	1 line and 41 video samples

3. Connector module

The LIS-SDI has its own connector module: FRS-SDI-C1, mounted at the rear of the sub-rack. See Figure 2.

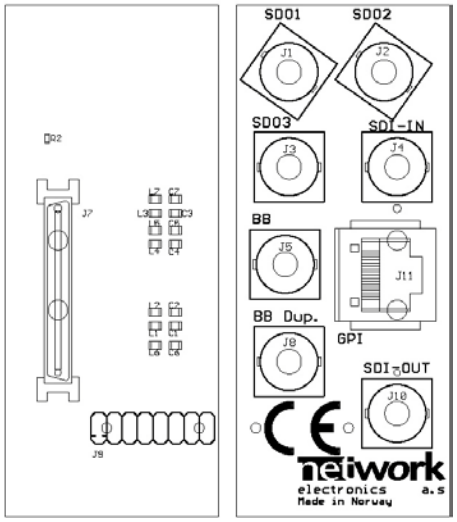

Figure 2: FRS-SDI-C1 connector module.

3.1 Mounting the connector module.

If the connector module is purchased separately, it should be mounted as described in the user manual for the sub-rack frame FR-2RU-10-2. This manual is also available from our web site: http://www.network-electronics.com/

3.2 Correspondence of connectors and signals

The FRS-SDI-C1 connector module has 7 BNC's:

SDO1	Line synchronized SDI output.
SDO2	Line synchronized SDI output.
SDO3	Line synchronized SDI output.
SDI-IN	SDI input.
BB	Black&Burst input
BB-DUP	Black&Burst passive loop through.
SDI-OUT	SDI-IN reclocked and buffered.

SDO1, SDO2 and SDO3 are equivalent 270 Mb/s SDI outputs.

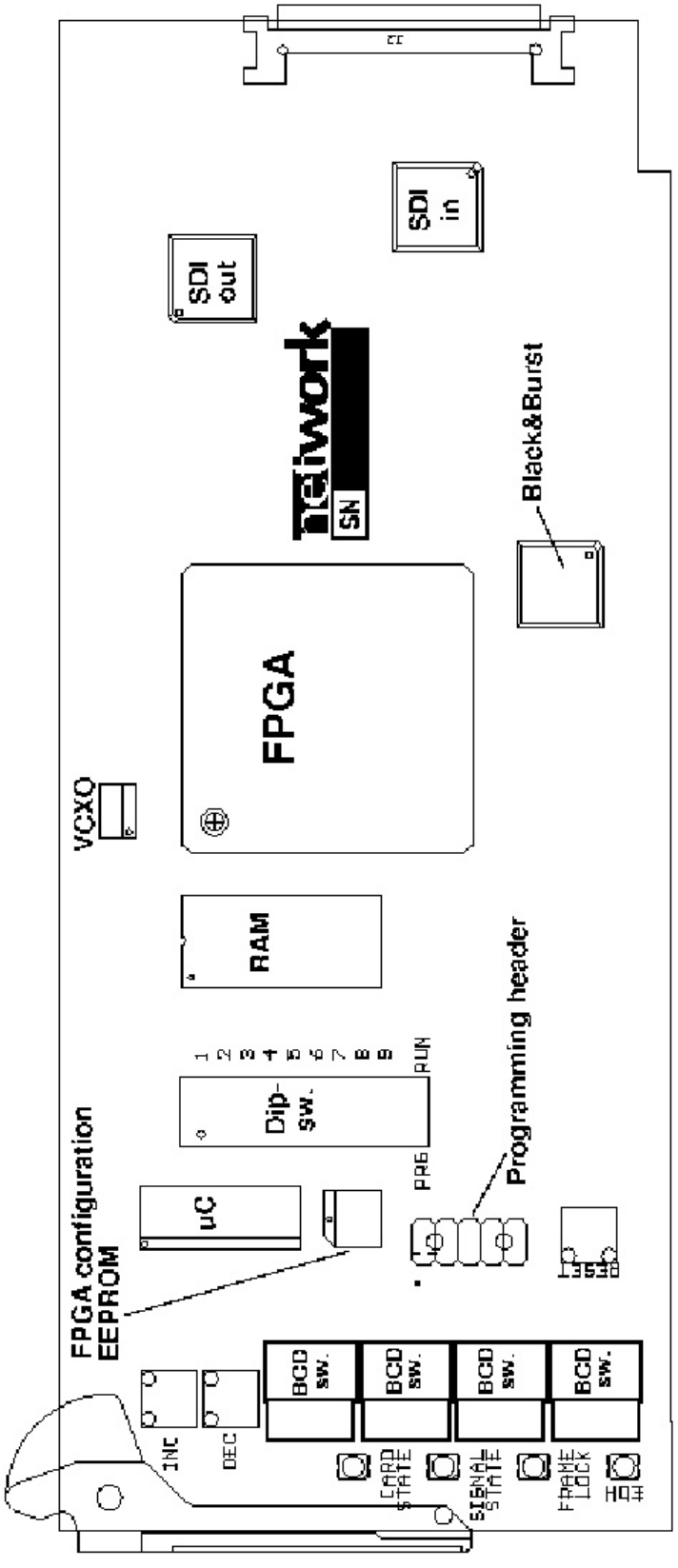

Figure 3: LIS-SDI simplified silkscreen (figure not to scale).

4. A more detailed description

4.1 Data path

SDI-IN is equalized and reclocked, then transferred bit serially to the FPGA. The FPGA descrambles and deserializes the input to 10-bit parallel, detects whether it is 625/50Hz or 525/60Hz, and writes the data to the line-buffer.

Data is fetched from the line-buffer, EDH is checked, the data is transferred to a chip that serializes and scrambles the signal, and drives the resulting 270 Mb/s SDI-signal onto the output connectors.

4.2 EEPROM

The LIS-SDI card actually has two EEPROM's. A small EEPROM is included in the microcontroller, while a larger external EEPROM holds the configuration memory of the FPGA and the input video chip.

Internal EEPROM
State variables are written to EEPROM in the microcontroller each time a configuration change is made. Basically, the card remembers it's setting between power-downs.

External EEPROM
The configuration memory of the FPGA and the input video chip is upgradeable. This is, however, a task for qualified maintenance personnel.

4.3 Two modes of operation

The LIS-SDI can operate in two modes, with or without line sync (switch 3 or lsync on/off command). When the line sync mode is off the card is used as a deglitcher. Then the output phase is not adjustable.
It is recommended that the Black&Burst is connected also when the card is just used as a deglitcher. The Black&Burst will insure that the output frequency is correct even if the input signal is lost. When the line sync mode is off, the SDI output is delayed by half a line with respect to the first SDI input detected. Any SDI used as input to the deglitcher must not be off phase by more than half a line with respect to any other input presented to the deglitcher.

When the line sync mode is turned on the LIS-SDI is used as a line synchroniser and a deglitcher. The output is synchronized to the Black&Burst. The output phase is adjustable over a full frame with respect to the Black&Burst. The internal video buffer is only one line long. Therefore the phase of the output SDI must be from 41 samples to 1 line and 41 samples after the input SDI. The internal processing delay is 41 samples. It is important to know the phase of the input SDI signals.
An example:
If the SDI inputs have a phase with respect to Black&Burst that is 0 lines and 0 samples, then the user could for instance set the output phase to 0 lines and 700 samples.

4.4 Power-up sequence

Summary: The LIS-SDI card remembers the settings it had the last time it held power.

At power-up, the card performs a self-check, and initiation. The manual mode switch is then sampled. If manual mode is enabled, the other switch settings are read and the state of the card set accordingly. If manual mode is disabled, the state the card held the previous time it was used is read from EEPROM. The interplay between the EEPROM, the switches and the GYDA (or other) controller adheres to the following simple rules:

- If a GYDA controller is present in a system, it can always override manual settings.
- If the manual mode is used together with a GYDA controller, the LIS-SDI will initiate as determined by the switches, and may then be overridden by the controller.
- If the manual mode is not used, the LIS-SDI will initiate as determined by the state of the EEPROM. It is subsequently controlled by the GYDA controller.
- At any time, when a state change is done, whether it is by switches or GYDA, the state is stored in the EEPROM as soon as it is detected.

4.5 When an input signal is lost

If SDI input disappears
If the SDI input disappears the output will be blanked SDI video.

If Black&Burst disappears
Given that stable SDI input and Black&Burst exists. If the Black&Burst disappears, the SDI input will still be output, but there are two important differences:
The internal clock will now be locked to the SDI input clock. The lsync mode (line sync mode) is now disabled.

If both inputs disappear
The output will be black video locked to the onboard crystal. This is not a reference clock, and drift out of video specification cannot be precluded.

4.6 Warm up time

The LIS-SDI uses a voltage controlled crystal oscillator (VCXO) to generate a clock that is locked to Black&Burst or SDI. At power up the LIS-SDI may use as much as 12 seconds to lock to a Black&Burst or SDI source.

5. Module status

5.1 GPI - General Purpose Interface

The GPI output is an open collector output.

Max current: 100mA
Max voltage: 30V

FRS-SDI-C1 GPI pinning:

Pin 1	Status	General error status for the module.
Pin 2	SDI input	No SDI input.
Pin 3	Black&Burst	Black&Burst not detected.
Pin 4	EDH	CRC error detected.
Pin 8	Ground	0 V

5.2 Light Emitting Diodes

Summary: Green LEDs are good, red LEDs are bad.

LIS-SDI implements four Light Emitting Diodes (LEDs) that show the state of the card. The LEDs are visible through the front-panel of the rack (see the user manual of FR-2RU-10-2 for details). The LEDs are described top-down; see also Figure 3 on page 9.

5.2.1 Card State

No Light No power, fuse F1 blown, LED malfunction or configuration memory lost.
Red A fundamental, probably electrical, error has been detected. The card is set in a passive state, so that it does not disturb other cards in the rack. While powering on, the CardState LED will light red for approximately 0.5 s while the card undergoes self-test.
Yellow The start-up sequence is running. The card is not yet ready
Green LIS-SDI is powered and ready.

5.2.2 Signal state

No Light Not used.
Red No SDI input.
Yellow Week SDI input
Green SDI input.

The “Signal state” LED will turn red for a short moment when there is an upstream switch in the SDI signal. This indicates that the LIS-SDI has detected a broken video stream and the output is switched to the internal video generator.

5.2.3 Frame Lock

No Light Not used.
Red No Black&Burst input.

Yellow Black&Burst input, not yet locked.
Green Black&Burst present, locked.

During normal operation, the status of the Black&Burst input is shown on this LED. The LED is used as an indicator if the pushbuttons are used to adjust delay. (See section 7.)

5.2.4 EDH

No Light Not used.
Red CRC error detected.
Yellow Not used.
Green No error detected.

6. SWITCHES

Summary: Most users will probably want switches 1 to 9 in the *off* position. All users should place switch 10 in the *on* position.

The LIS-SDI card implements a Dual-Inline switch (DIP-switch) that provides 10 individual On/Off switches. The purpose of the switches is to offer you an easy interface to some features of the LIS-SDI card, without the need of a GYDA controller. Table 1 gives the general layout of the switches. The switches are numbered from '1' at the top and downwards to the bottom, see Figure 3. A switch is *on* when the tap is displaced in direction of the back-plane.

The LIS-SDI card is shipped with all switches, except switch 10, in the Off-position. Switch number 10 should always be in the On-position. The switches are discussed in logical rather than numerical order.

Switch #	Function	Comment
1	Manual mode on/off	When on, enables switches 2, 3, and 4.
2	EDH disable on/off	When on, the EDH will not be inserted into the SDI-output.
3	Line sync on/off	When on, the output timing is referenced to Black&Burst.
4	TRS Replace on/off	When on, the digital sync words from the internal video generator is used instead of the sync from the incoming SDI.
5	Reserved	
6	Reserved	
7	Reserved	
8	Factory Reset on/off	To restore internal EEPROM only
9	Reserved	
10	Running mode on/off	For factory use only.

Table 1: Summary of the DIP switches.

Switch 5, 6, 7, 9 and 10 are mainly for factory use, while switches 1, 2, 3 and 4 will be used when no GYDA controller is available.

Switch 10 - Programming mode

Switch 10 is purely used for service upgrade of the LIS-SDI card. It should always be in the *on* position. If switch 10 is in the *off* position, the CardState LED will light up red, and the LIS-SDI card will enter programming mode. This causes no harm, but the card will not work in this mode.
Factory setting is switch 10 in *on* position.

Switches 5, 6, 7 and 9 - Reserved
These switches are reserved for future expansion, and should always be in the *off* position.
Factory setting is switch 5, 6, 7 and 9 in *off* position.

Switch 8 - Reset to factory default
LIS-SDI contains EEPROM that is affected by your choices. Switch 8 is implemented to reset the EEPROM to factory default. Its use is shown in Table 2.

Action	Comment
Power down.	
Turn switch 8 *on*.	
Power up.	LIS-SDI enters a special state where the EEPROM is restored to factory default values. This is flagged by the LEDs, they are all yellow.
Power down.	
Turn switch 8 *off*.	If you want the DIP switches to be placed in the factory default position, this is the time to do so: Turn switches 1 through 9 to the *off* position. Switch 10 should, as always, be turned to the *on* position.
Power up.	The card EEPROM is now reset to factory settings.

Table 2: Method to restore the LIS-SDI card to factory settings.

Remember to let some seconds pass by each time you power down, to allow capacitors to be fully discharged.

Switch 1 - Manual mode
Switch 1 is the manual mode switch. If *on*, the LIS-SDI is primarily assumed to be operated with switches alone. If *off*, the LIS-SDI is assumed to be used with a GYDA controller.
Factory setting is switch 1 in *off* position.

With switch 1 off
While in automatic mode, switches 2 and 3 are without any effect.

With switch 1 on
In manual mode, the functionality of switches 2 and 3 is as follows:

Switch 2
Switch 2 turns on/off disabling of EDH in the output SDI. With switch 2 *off*, the EDH is included in the SDI signal, with switch 2 *on*, EDH is not included.
Factory setting is switch 2 in *off* position.

Switch 3
Switch 3 turns on/off the line sync mode. With switch 3 *off*, the video output is delayed half a line with respect to the first detected SDI input. The LIS-SDI tolerates upstream video

switching on the input SDI. The deglitching only works if any of the different SDI inputs has a phase difference not more than half a line from any of the other SDI inputs that will be used with the LIS-SDI.
With switch 3 *on* the output phase can be adjusted with respect to the Black&Burst. This is called line sync mode. The output must be adjusted to a phase that keeps the total delay through the card between 41 samples and 1 line and 41 samples.

Switch 4
Switch 4 turns on/off the TRS-Replace mode. With 4 *off* the LIS-SDI is transparent to the video data. With switch 4 *on* the LIS-SDI will replace the SDI sync words with the sync word generated by the internal video generator. This is a way to correct video that has wrong sync words. When both switch 3 and switch 4 is placed in the *on* position, it is possible to do a vertical shift of the video data with respect to the video sync words. Be careful. Audio and EDH-information is also shifted. The LIS-SDI will generate EDH information on the correct EDH line after the vertical shifting.

7. Pushbuttons

LIS-SDI contains three pushbuttons.

7.1 Reset

The lower pushbutton is a reset switch (see Figure 3). It has the same effect as a power-on.

7.2 INC and DEC

Summary: The phase of the outgoing video with reference to Black&Burst may be adjusted.

These two buttons is used to fine adjust the horizontal delay in samples from 0 to 1715 in 525/60Hz and from 0 to 1727 in 626/50Hz.
The INC button will increase the delay and the DEC button will decrease the delay. There is no wrap-around. The INC and DEC buttons will work even if Switch 1 (see section 6) is not set to manual mode.

8. BCD switches

LIS-SDI contains four BCD switches. These switches are used to set the delay when the DIP-switch 1 is set to manual mode, see section 6.

8.1

The upper BCD switch is not used on the LIS-SDI.

8.2 Lines delay

The second BCD switch from the top is used to adjust the phase in steps of hundred lines.
The third BCD switch from the top is used to adjust the phase in steps of ten lines.
The last BCD switch is used to adjust the phase in steps of 1 line.
The phase in lines is set with respect to Black&Burst when Black&Burst is detected and is not used when Black&Burst is absent.

8.3 Delay range

The minimum delay through the LIS-SDI is 41 27MHz video samples. The maximum delay through the card is 1 line and 41 27MHz samples.

9. Interface with GYDA or other controllers

LIS-SDI follows the flashlink®-protocol; see the definition of the protocol available from our web site:
http://www.network-electronics.com/. LIS-SDI can also be used with any controller or controller system that adheres to the flashlink®-protocol, using the RS422 bus. For more information on the electrical interconnect, see the documentation of **FR-2RU-10-2**. The available commands are shown in Table 3.

Command	Response	Comment
?	Yes	The “Hello” command.
info	Yes	Gives back the card state.
EDH on	xxxxOK	Turn on EDH in output SDI.
EDH off	xxxxOK	Turn off EDH in output SDI.
Lsync on	xxxxOK	Set lsync mode on.
Lsync off	xxxxOK	Set lsync mode off.
TRSReplace on	xxxxOK	Replace SYNC words.
TRSReplace off	xxxxOK	Use original sync words.
delay [xxx] [xxxx]	xxxxOK	Set the delay in lines and samples.
get [0xHH]	Yes	Get a value from a numbered register.
set [0xHH] [0xHH]	No	Set a value to a numbered register.

Table 3: All commands available to the user

9.1 The '?' command

According to the flashlink®-protocol, no card can use the RS422-bus before the '?' (hello) command is sent the card at least once. The response from LIS-SDI will be:
xxxxLIS-SDI
PIC sw rev X.X.X
FPGA sw rev X
Protocol ver X.X

Here xxxx denotes the source and destination rack and slot coordinates, while **X** represents a version number. As of medio April 2003, these revisions would be:
xxxxLIS-SDI
PIC sw rev 1.0.2
FPGA sw rev 1.2
Protocol ver 1.0

9.2 The “info” command

This command reports the entire state of the card. An example:
xxxxSDI signal strength > 90
BBurst detected and freq. locked
Lsync enabled, delay ref. to BB line: 0, sample: 0
Video standard: 625
No EDH: 0
Error full field:
crc: 0
unk: 0
ues: 0
ida: 0
idh: 0
eda: 0
edh: 0
Error active video:
crc: 0
unk: 0
ues: 0
ida: 0
idh: 0
eda: 0
edh: 0

The “info” command is composed by many minor lines, fully specified in Table 4. In general, when a condition is normal, it is not reported. For instance, EDH will normally be enabled; it is only when it is disabled its state is reported.

9.3 Delay command

The **delay** command sets the output phase in lines and samples with respect to Black&Burst.

Example:
xxyydelay 178 1267
The output SDI output has a phase delayed 178 lines and 1267 samples with respect to the Black&Burst.

9.4 EDH-, Lsync- and TRSReplace-commands

Commands to turn on/off the *lsync*-feature, TRSReplace or the EDH inclusion in the SDI output are both straightforward text, see Table 3.

9.5 Get and Set

These commands are factory internal. The end-user should avoid these commands:

Status of	Status string	Comment
SDI input	No SDI input	SDI input is not detected.
	SDI signal strength > 90 %	Strong SDI signal.
	SDI signal strength < 10 %	Weak SDI signal.
	SDI signal strength = *%d* %	*%d* is a number from 10 to 90.
Black&Burst	No BBurst input	No Black&Burst detected.
	BBurst detected not locked	LIS-SDI is unable to synchronize the analog output to the detected Black&Burst input. The Black&Burst signal may be out of LIS-SDI's frequency range.
	BBurst detected and locked	LIS-SDI generates analog output synchronized to the detected Black&Burst input signal.
EDH	EDH insertion disabled	No EDH information in SDI output.
	(No EDH status string)	EDH information is included in SDI output.
Delay	Locked to Bburst line: *xxx*, sample: *xxxx*	*xxx* is an integer from 0 to 624 and *xxxx* is an integer from 0 to 1727. This line indicates that the card is in Lsync mode.
	Lsync disabled, delay ref. to BB line: *xxx*, sample: *xxxx*	The card is not in Lsync mode and is used as a deglitcher. Black&Burst is not used as an output timing reference, only as a frequency reference. The *xxx* and *xxxx* shows what the reference would have been if lsync were enabled.
TRS Replace	TRS Replace on	The incoming video SYNC words are replaced with the SYNC words generated by the internal video generator.
	(No TRS Replace string)	The incoming video SYNC words are used as it is.
Video standard	Video standard 625	The video standard is 625 lines/50Hz
	Video standard 525	The video standard is 525 lines/60Hz
EDH	No EDH: *%d*	Count fields where EDH is absent.
	Error full field:	Label to present next 7 lines as “full field”-error counters.
	crc: *%d*	Full field CRC-error is detected here.
	unk: *%d*	Unknown status-flag is detected.
	ues: *%d*	Unknown error status-flag is detected.
	ida: *%d*	Internal error detected already-flag is detected.
	idh: *%d*	Internal error detected here-flag is detected.
	eda: *%d*	Error detected already-flag is detected.
	EDH: *%d*	Error detected here-flag is detected.
	Error active video:	Label to present next 7 lines as “active video”-error counters.
	crc: *%d*	Active video CRC-error is detected here.
	unk: *%d*	Unknown status-flag is detected.

	ues: *%d*	Unknown error status-flag is detected.
	ida: *%d*	Internal error detected already-flag is detected.
	idh: *%d*	Internal error detected here-flag is detected.
	eda: *%d*	Error detected already-flag is detected.
	edh: *%d*	Error detected here-flag is detected.
	%d is a decimal number from 0 to 65535 for all the 15 EDH counters above.	

Table 4: The info command broken up in components.

General environmental requirements for Network flashlink® equipment

1. The equipment will meet the guaranteed performance specification under the following environmental conditions:

- Operating room temperature range 0°C to 40°C
- Operating relative humidity range up to 90% (non-condensing)

2. The equipment will operate without damage under the following environmental conditions:

- Temperature range -10°C to 50°C
- Relative humidity range up to 95% (non-condensing)

Product Warranty

The warranty terms and conditions for the product(s) covered by this manual follow the General Sales Conditions by Network Electronics AS. These conditions are available on the company web site of Network Electronics AS:

www.network-electronics.com

Materials declaration and recycling information

Materials declaration

For product sold into China after 1st March 2007, we comply with the "Administrative Measure on the Control of Pollution by Electronic Information Products". In the first stage of this legislation, content of six hazardous materials has to be declared. The table below shows the required information.

組成名稱 Part Name	Toxic or hazardous substances and elements					
	鉛 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr(VI))	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
LIS-SDI	X	O	O	O	O	O

O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

Environmentally-friendly use period

The manual must include a statement of the "environmentally friendly use period". This is defined as the period of normal use before any hazardous material is released to the environment. The guidance on how the EFUP is to be calculated is not finalised at the time of writing. See http://www.aeanet.org/GovernmentAffairs/qfLeOpAaZXaMxqGjSFbEidSdPNtpT.pdf for an unofficial translation of the draft guidance. For our own products, Network Electronics has chosen to use the *50 year figure* recommended in this draft regulation.

Network Electronics suggests the following statement on An "Environmentally Friendly Use Period" (EFUP) setting out normal use:

> **EFUP is the time the product can be used in normal service life without leaking the hazardous materials. We expect the normal use environment to be in an equipment room at controlled temperature range (0ºC - 40ºC) with moderate humidity (< 90%, non-condensing) and clean air, not subject to vibration or shock.**

Further, a statement on any hazardous material content, for instance, for a product that uses some tin/lead solders:

> **Where a product contains potentially hazardous materials, this is indicated on the product by the appropriate symbol containing the EFUP. The hazardous material content is limited to lead (Pb) in some solders. This is extremely stable in normal use and the EFUP is taken as 50 years, by comparison with the EFUP given for Digital Exchange/Switching Platform in equipment in Appendix A of "General Rule of Environment-Friendly Use Period of Electronic Information Products". This is indicated by the product marking:**

It is assumed that while the product is in normal use, any batteries associated with real-time clocks or battery-backed RAM will be replaced at the regular intervals.

The EFUP relates only to the environmental impact of the product in normal use, it does not imply that the product will continue to be supported for 50 years.

Recycling information

Network Electronics provides assistance to customers and recyclers through our web site http://www.network-electronics.com. Please contact Network Electronics' Customer Support for assistance with recycling if this site does not show the information you require.

Where it is not possible to return the product to Network Electronics or its agents for recycling, the following general information may be of assistance:

- Before attempting disassembly, ensure the product is completely disconnected from power and signal connections.
- All major parts are marked or labelled to show their material content.
- Depending on the date of manufacture, this product may contain lead in solder.

Some circuit boards may contain battery-backed memory devices.

EC Declaration of Conformity

MANUFACTURER	Network Electronics AS P.B. 1020, N-3204 SANDEFJORD, Norway	
AUTHORISED REPRESENTATIVE (Established within the EEA)	Not applicable	
MODEL NUMBER(S)	LIS-SDI	
DESCRIPTION	SDI Line Synchroniser	
DIRECTIVES this equipment complies with	LVD 73/23/EEC EMC 89/336/EEC	
HARMONISED STANDARDS applied in order to verify compliance with Directive(s)	EN 55103-1:1996 EN 55103-2:1996 EN 60950-1:2006	
TEST REPORTS ISSUED BY	**Notified/Competent Body**	**Report no:**
	Nemko	67639001
TECHNICAL CONSTRUCTION FILE NO	Not applicable	
YEAR WHICH THE CE-MARK WAS AFFIXED	2006	
TEST AUTHORIZED SIGNATORY		
MANUFACTURER	**AUTHORISED REPRESENTATIVE (Established within EEA)**	**Date of Issue** 2007-09-11
	Not applicable	**Place of Issue** Sandefjord, Norway

NETWORK ELECTRONICS ASA
O.nr. 976 584 201 MVA

Name Thomas Øhrbom

Position Quality Manager
(authorised signature)

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